UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

MEMORANDUM

TO: Nancy Lindsay, Chief
Superfund Enforcement Branch (H-7)

THROUGH: Dan Opalski, Chief
Enforcement Programs Section (H-7-2)

FROM: Fred Schauffler, Remedial Project Manager
Enforcement Programs Section (H-7-2)

SUBJECT: Five-Year Review Report
Motorola 52nd Street Superfund Site, Phoenix, AZ

DATE: November 9, 1995

Attached you will find the first Five-Year Review report for the Motorola 52nd Street Superfund site in Phoenix, Arizona. The Arizona Department of Environmental Quality conducted the review and prepared the report for this state-lead site pursuant to OSWER Directives 9355.7-02 and 9355.7-02A. It is a statutory review. This document, which will become a part of the site file, is based on a Type IA review which is applicable to a site at which response is ongoing.

The report addresses the protectiveness of the interim remedy for Operable Unit One (OU 1), where the initiation of remedial action occurred in August 1990. The interim remedy for OU 1 includes a groundwater extraction and treatment system as well as a soil vapor extraction (SVE) system to address vadose zone contamination. The groundwater portion of the remedy is operating at full scale, while the SVE remedy has been through the pilot project stage and is now in final design. In their review, ADEQ raises concerns about whether the groundwater containment system has attained complete capture of the plume within the bedrock. Based on my review of the data submitted by Motorola, I do not share ADEQ's level of concern on this issue. Nonetheless, I do agree that this issue should continue to be addressed in future discussions with Motorola. Since the area downgradient of OU1 is already heavily contaminated, any "leakage" from OU1 will have minimal additional impact. Further, the OU2 containment system, when operational, will probably capture any contaminants that elude the OU1 system. The next five-year review will be expanded to include the interim groundwater remedy for OU2.

I recommend that you approve this report.

Five-Year Review Report Accepted and Approved By:

Nancy Lindsay, Chief
Superfund Enforcement Branch

11/16/95
Date

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

H-4991.14

TO: Motorola M52 File

THRU: Michele Robertson, Manager
Remedial Investigations Hydrology Unit

FROM: Bill Ruddiman, Hydrologist
Remedial Investigations Hydrology Unit

Jeff Kulon, Project Manager
Remedial Projects Unit

DATE: September 5, 1995

RE: **5-year Review of Operable Unit 1, Motorola M52 Site**

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I. BACKGROUND

The Motorola 52nd Street plant is located in an urban area of east central Phoenix, Arizona and has operated continuously since 1956. Various chlorinated solvents, including TCE and TCA were used in industrial processes at the plant and were then discharged to on-site dry wells or leaked from pipes and tanks into the soil and subsequently moved into the aquifer. The aquifer lies in both the alluvium and bedrock at the site. Both the bedrock and alluvium portions of the aquifer were found to be contaminated. Dense nonaqueous phase liquid (DNAPL) has been found in the fractured bedrock underlying the plant. The operable unit area includes the plant site and the area west of the plant to 46th Street (see figure 1.1).

The operable unit remedy consists of 15 on-site and nine off-site extraction wells connected to a ground water treatment plant and a monitoring well network of 68 wells, including 27 multilevel wells. The four on site extraction wells in the courtyard area and 11 wells in the southwest parking lot (see figure 1.2) are used for source removal. The nine off-site extraction wells form a hydraulic containment barrier to prevent further downgradient movement of the contaminant plume to the west. The pilot ground water system began operation in August of 1990 and continued until 1992, when the permanent system began operation. Operation of the permanent system was suspended in June 1993 due to a vinyl chloride air emission problem. The problem was corrected and the system was reactivated in December of 1993.

The ground water treatment plant operates at an average rate of 600 gallons per minute and consists of two air strippers connected in series combined with liquid phase granular activated carbon polishing. Vapors produced by the air strippers are treated with granular activated carbon and reinjected into the air stream of the strippers. Treated water is used by Motorola to supplement water supplied by the City of Phoenix.

Soil vapor extraction is also part of the prescribed remedy for the operable unit. A soil vapor extraction pilot project was initiated in the courtyard portion of the facility, and a pilot air sparge-soil vapor extraction project has operated in the southwest parking lot area of the plant. Operation of the courtyard project has been suspended while the data obtained are analyzed. Design of a full scale soil vapor extraction-air sparging system for the southwest parking lot area is currently under development.

II. STATUS OF THE REMEDIAL ACTION

The ground water remediation system has operated continuously since December 1993 with down time for maintenance of less than 7%. 736.16 million gallons of ground water have been treated as of June 1995 and 1622 gallons of solvents have been removed.

III. PROTECTIVENESS OF THE REMEDIAL ACTION

Pursuant to the consent order for this facility, Motorola submits annual reports on the effectiveness of the remediation. Arizona Department of Environmental Quality has reviewed these reports and submitted comments (see appendix A). In general, ADEQ has determined that the remedy is effective in the alluvial portion of the aquifer. Containment of the contaminant plume in the bedrock portion of the aquifer is controversial.

IV. FUTURE ACTIONS PLANNED

There is currently some question as to whether the hydraulic capture wells are effective in containing contaminants migrating down gradient from the facility. Monitor well DM 603 (see Figure 1.1), immediately down gradient of the OU1 capture well field, has had an 40% increase in the concentration of TCE from the sampling port below the bedrock-alluvium interface during the past three quarters, increasing from 8,100 ug/l to 20,000 ug/l. Review of the TCE concentration data from 1991 to present indicates that current concentrations are at a historic high and are more likely coming from a source up gradient rather than being drawn back from down gradient as an artifact of the capture wells of OU1.

At least two conclusions are possible. The first possibility is a nearby undiscovered source of TCE exists near the well. This would appear unlikely, as only the samples collected below the bedrock interface show an increase. A nearby source should have caused increased concentrations in the samples taken from the alluvium as well as those collected from below the bedrock interface.

The second and most likely cause of the increased concentrations of TCE detected in the in the well is migration of TCE from the facility. If this is the case, OU1 hydraulic capture field has not attained complete capture.

Meetings have been scheduled between Motorola and the ADEQ to discuss the TCE concentration increases in DM 603.

NEXT REVIEW:

The next review of this Operable Unit remedy will occur in 2000.

cc: Maria Fant
Fred Schauffler, EPA Region IX

WR/JK/wr

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Figures

LEGEND:

WELL TYPE	SYMBOL
WESTBAY	▲
CONVENTIONAL	●
MP	■
EXTRACTION	✱
PRIVATE	✦

● DM 101 NAME OF WELL

NOTES:

1. MOTOROLA MONITOR AND EXTRACTION WELLS, PRIVATE WELLS AND ADEQ MONITOR WELLS ACTIVE IN 1992 ARE SHOWN.
2. FOR MORE DETAILED INFORMATION ON WELLS, REFER TO MI52 QUARTERLY REPORTS AND THE 1992 MI52 FR RI REPORT.
4. THE MI52 OPERABLE UNIT GROUND-WATER EXTRACTION AND TREATMENT SYSTEM INCLUDES 4 ONSITE EXTRACTION WELLS (DM 301 TO DM 304), 9 OFFSITE EXTRACTION WELLS (DM 305 TO DM 313), CONVEYANCE DUAL-WALLED PIPING, AND THE INTERGRATED GROUND-WATER TREATMENT PLANT (IGWTP).
3. SECTIONS AA' AND BB' ARE SHOWN ON FIGURES 1.3 AND 1.4 RESPECTIVELY.

B'
EW-18
MORGAN (4625G)
DM 115
DM 125
AZNGD-2A&23
AZNGD-1
DM 119
DM 602
DM 305
A'
DM 306
DM 112
MP 30
DM 114
MP 28
DM 303
MP 36
DM 304
DM 101
DM 603
DM 117
DM 601
BRILL STREET
DM 301
DM 307
DM 302
MP 25
MP 37
DM 606
DM 111
DM 308
MP 03
DUAL WALL PIPELINE
DM 604
DM 309
MI52 OPERABLE UNIT
IGWTP
MP 13
DM 310
DM 605
DM 311
DM 115
MOTOROLA 52nd STREET FACILITY
DM 107
DM 723
DM 312
DM 718
DM 313
DUAL-WALL PIPELINE
DM 201
MP 16
DM 724
DM 727
DM 728
ROOSEVELT STREET
DM 733
DM 734
DM 729
MP 20
DM 120
AZSLD
DM 505
EAST PAPAGO FREEWAY
ROOSEVELT STREET
DM 512
DM 502
DM 501
DM 503
DM 701
DM 513
EW-2
DM 504081
DM 504
DM 122
DM 123
DM 509
EW-3
DM 124
LANDMADE
VAN BUREN STREET
DM 506
SRP 16E-5N
DM 507
A
B
GRAND CANAL
DM 508
WASHINGTON STREET
EW-1
APPROXIMATE SCALE
0 1000 2000
IN FEET
N
35th STREET
McDOWELL ROAD
SRP 16.9E-6N
32nd STREET
40th STREET
44th STREET
48th STREET
50th STREET
52nd STREET
QLD CROSSCUT CANAL
HOHOKAM FREEWAY

VICINITY MAP
SCALE: 1"=5 MILES
BLACK CANYON FWY
I-10
PAPAGO FWY
PKWY
SQUAW PEAK
24TH ST
MOTOROLA 52ND ST FACILITY
52ND ST
SCOTTSDALE
McDOWELL RD
DESERT HWY
SALT RIVER
SKY HARBOR INTERNATIONAL AIRPORT
I-17
HOHOKAM EXPWY
SCOTTSDALE RD
COUNTRY CLUB DR
SUPERSTITION FWY

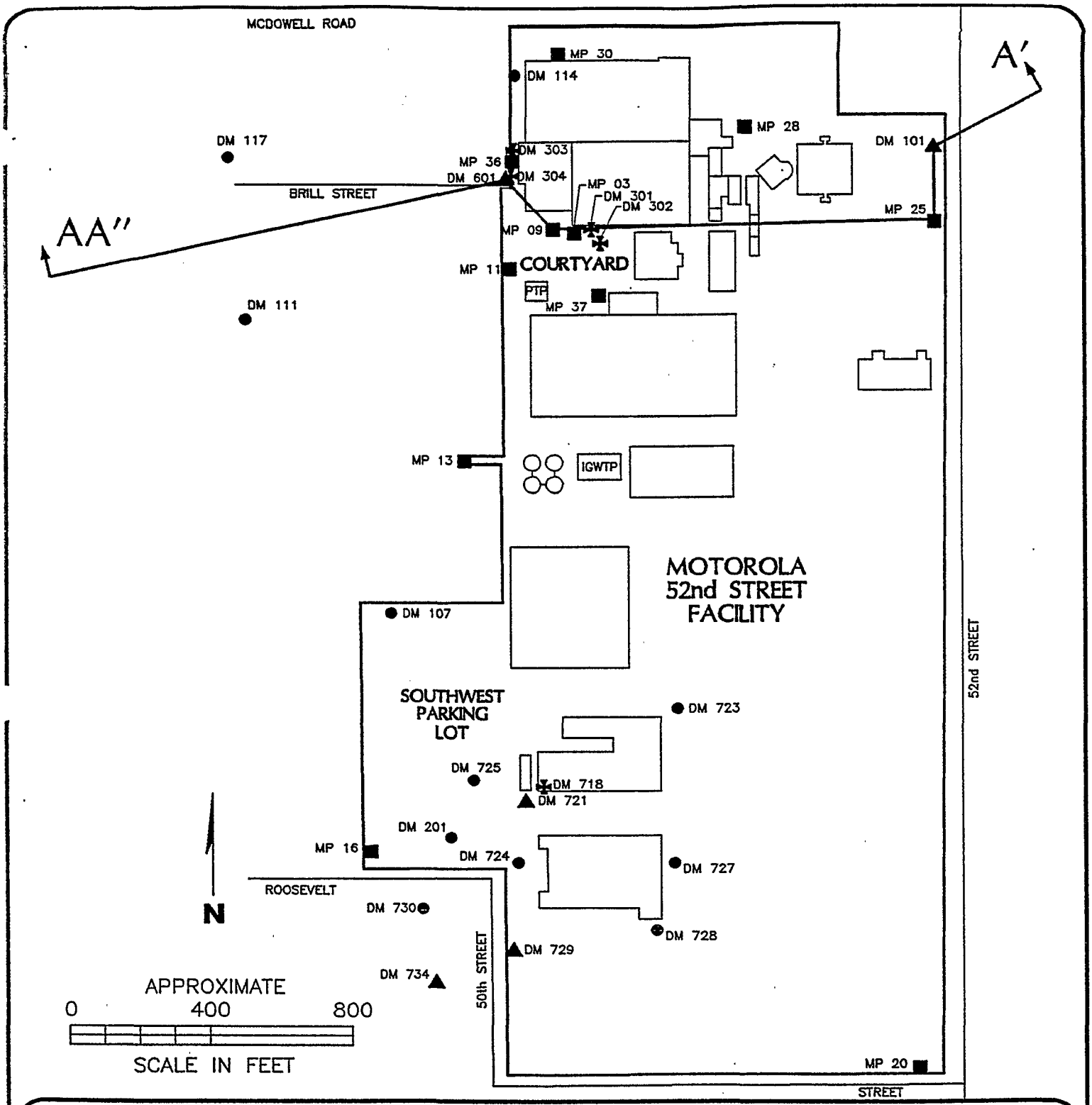
WELL LOCATION MAP AND MI52 OPERABLE UNIT

Figure 1.1

DAMES & MOORE

MI52 OU EFFECTIVENESS REPORT
APRIL 1995

AD3778-04-26-95



LEGEND:

WELL TYPE

CONVENTIONAL	●
PIEZOMETER	○
EXTRACTION	✠
WESTBAY	▲
MP	■

✠ DM 301 NAME OF WELL

NOTES:

1.) SECTION A'A'' IS PART OF SECTION AA' SHOWN ON FIGURES 1.1 AND 1.3.

WELL LOCATION MAP MI52 FACILITY

Figure 1.2

DAMES & MOORE

MI52 OU EFFECTIVENESS REPORT
APRIL 1995

-27-95

A0377

Appendix A

Correspondence Relating to the Effectiveness of the Motorola 52nd Street Operable Unit

FILE COPY

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

April 11, 1995
RPU95,209 E-4070._

Mr. Thomas R. Suriano
Motorola, Inc.
5005 E. McDowell Road, MD-B204
Phoenix, AZ 85008

RE: January 19, 1995 Materials Supporting Operable Unit (one) Effectiveness Report for 1993, Motorola 52nd Street Site

Dear Mr. Suriano:

The Arizona Department of Environmental Quality (ADEQ) has reviewed the above-referenced materials. We appreciate Motorola's patience in supplying the information, as well as meeting to discuss the information with ADEQ and the technical committee. After reviewing the materials and attending the meetings, ADEQ has determined that the groundwater portion of the remedy for Operable Unit One effectively serves its purpose, when the system is operational. In future effectiveness reports, Motorola should include sections discussing the use of hydraulic head information for determining effectiveness. The reports should supply information similar to the supplemental information supplied by Motorola on January 19, 1995.

The letter accompanying the January 19, 1995 submittal responded to ADEQ comments in addition to those in regard to the effectiveness of the groundwater portion of the remedy. In response to ADEQ concerns regarding the progress of soil vapor extraction (SVE) at the facility, the January 19 letter discusses that pilot studies have been conducted, and reports submitted to ADEQ. As the letter indicates, the report describing the Courtyard area SVE pilot program was submitted to ADEQ in December 1994, approximately one month after ADEQ's letter arguing the lack of on-going SVE. It is also noted that the report describes activities conducted between September 1992 and May 1993, and that the results indicate that additional investigations are necessary. It is precisely this extended study which is the cause for ADEQ's concerns. The pilot studies were completed almost two years ago, yet we only recently received a report, which recommends additional study. ADEQ recommends that Motorola increase its level of effort to complete the soil vapor extraction portion of the remedy for Operable Unit One, as required by the 1989 Consent Decree.

Motorola's January 19 letter discusses the progress of air sparging-SVE plans for the Southwest Parking Lot area. ADEQ is encouraged that progress is now at the pre-final design stage. However, ADEQ was not included in the development of workplans for

this design, or in the review of preliminary design packages. Motorola should incorporate into its schedule for the completion of the design a minimum of two months for ADEQ's review of the pre-final design package. This time will be necessary for ADEQ to become sufficiently familiar with the project to allow adequate comments.

In response to ADEQ's previous comment on the modifications to the groundwater treatment plant to avoid vinyl chloride emissions to the air, Motorola referred to a December 19, 1994 letter to ADEQ. The December 19 letter states that the interim adjustment adequately prevents the potential for emissions. Further modifications will not be required by ADEQ provided that Motorola continues to monitor and report on the air phase of the system. A description of the ultimate fate of vinyl chloride being extracted from the groundwater should also be submitted. It should be understood that future problems with air emissions will automatically trigger additional modifications.

Also described in the December 1994 letter was Motorola's plans for using treated water from the groundwater treatment plant in cooling towers instead of the current use in the manufacturing processes. This use appears to be consistent with Consent Decree language. ADEQ understands that Motorola will make any necessary air quality permit revisions with Maricopa County, however ADEQ also encourages Motorola to conduct appropriate community involvement for this planned change before it takes place.

In regard to reporting requirements pursuant to the Consent Decree, the requirements can be confusing. Paragraph 8.1.1 states that "Motorola shall provide in writing, annual summary progress reports and quarterly progress reports to Arizona". The next sentence states "After one year of routine operation, **progress reports** [emphasis added] will be due semi-annually." Motorola requested in July 1993 to begin submitting semi-annual progress reports instead of quarterly progress reports based on this Paragraph. The emphasized term does not specify quarterly or annual summary progress reports. One interpretation of this would be that not only does the interval for quarterly progress reports change to semi-annual, but annual summary progress reports change to semi-annual as well. Since the information requirements of quarterly and annual summary progress reports differ, as specified in the Consent Decree, this interpretation would greatly increase Motorola's semi-annual reporting effort.

Motorola requested, in a December 1994 letter, to amend the submittal date specified in the Consent Decree for the annual

summary progress report. ADEQ believes that language should also be incorporated into the amendment clarifying reporting requirements. We would like to meet and discuss these and other potential additions to the consent decree amendment. Contrary to Motorola's recommendation that additional reports be prepared to report only on soil vapor extraction activities, ADEQ would like the amendment to combine reporting into fewer documents. This will streamline the reporting process, reduce the level of effort required by both Motorola and ADEQ, and make the information more publicly digestible.

ADEQ appreciates Motorola's continued cooperation in these matters. As always, you may contact me at 207-4181 if you have any questions regarding this letter.

Sincerely,

Jeffrey P. Kulon
Project Manager
Remedial Projects Unit

cc: Fred Schauffler, EPA Region IX

FILE COPY

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

November 28, 1994 E-4070._
RPU94,551

Thomas R. Suriano
Manager, Superfund Remediation Projects
Motorola, Inc.
5005 E. McDowell Road, MD-B204
Phoenix, AZ 85008

RE: Motorola 52nd Street
Operable Unit Effectiveness Report, 1993
dated September 1994

The Arizona Department of Environmental Quality (ADEQ) has reviewed the above document. Data submitted with the report indicates that the six months of remedy operation in 1993 were inadequate to capture the plume within the bedrock. Capture within the alluvium is also uncertain. The period of operation is insufficient for ADEQ to determine whether the Operable Unit One (OU1) remedy has created a capture zone in the alluvium. The lack of capture in the bedrock is important since the majority of the contamination east of the OU1 is within the bedrock.

General Comment:

1. Executive Summary - Conclusions and statements made in the Executive Summary appear inconsistent with data submitted and referenced in the main portion of the report. Generally, the data submitted does not indicate capture of the contamination 180 feet into the bedrock. Specific details will be provided in the detailed comments below.

   Data from Well DM-606 indicate that the contamination is present at least 450 feet below the ground surface. Beneath the site east of the OU1 extraction wells, the majority of the contamination is within the bedrock (Figure 24 of the report).

   Based on ADEQ's review Motorola is not capturing the majority of the contamination in OU1 and needs to begin determining alternatives to capture the portion of the contamination which is escaping.

Specific Comments:

2. Section 1.2 Operable Unit Ground-water Extraction System Operations - ADEQ is aware that extraction well DM-313 has

been taken offline, however the well should be used as a monitor well. ADEQ requests that Motorola add DM-313 to the Poor Quality Groundwater Withdrawal Permit (PQGWWP) monitoring plan.

3. 2.3 Hydraulic Capture Offsite - ADEQ has previously commented on the depiction of a symmetrical capture zone as seen in figures 5, 6A, 17 and 26. The aquifer system is described as an alluvial/bedrock aquifer. Past reports have indicated that the bedrock portion is fracture dominated. If the bedrock flow is fracture dominated then the capture zone should reflect the fracture pattern and should not be symmetrical.

   This comment is similar to one prepared in response to the effectiveness report for 1992. Motorola should provide justification for the present depiction of the capture zone.

4. 2.3.2 Vertical and 2.5 Vertical Gradient - There is an apparent contradiction between section 2.3.2 and Section 2.5 Vertical Gradients. Section 2.3.2 indicates that the OU1 remedy has an effect on the water levels and is effective down to 300 ft below land surface (bls). However, Section 2.5 claims that the OU1 remedy has no effect on the gradient in either the alluvium or the bedrock. It is difficult to understand how the OU1 remedy can effect the water levels (changes of 4-16 feet) yet be unable to change the gradients in the same wells. If the gradient is not changed, the OU1 remedy cannot be effectively capturing the contamination.

   In addition, Table 2.2 indicates that the dominant gradient direction is downward. If the gradient is downward then any contamination below the depth of the extraction well would not be captured by a well screened above it. In order to capture contaminants below the extraction wells, gradients should be upward toward the extraction wells. It appears that the extraction wells are not having any effect on the bedrock below the bottoms of the wells.

   Justification is required to explain how Motorola believes that the OU1 extraction wells are capturing contamination from areas where the gradient is downward and below the bottom of the extraction wells.

5. Section 2.6 Model Predicted versus Observed Drawdowns - The second paragraph on page 2-10 references Figure B.6. The correct reference should be Figure D.6.

6. Section 3.1 Distribution of TCE During Pumping - The first paragraph references the 1993 OU Effectiveness Report. The correct reference should be the 1992 OU Effectiveness Report.

7. Section 3.0 Contaminant Migration - The report is using the decrease in concentration to help determine the remedy effectiveness. Based on the data submitted with the report, ADEQ agrees, in part, with the conclusion that it is too early to evaluate the effectiveness of the OU1 remedy. ADEQ believes that this conclusion is applicable to the alluvial portion of the aquifer only. The data submitted regarding the bedrock indicate that there is no capture or containment in the bedrock below the depth of the extraction wells.

   A significant portion of the contamination present in the bedrock is apparently not being captured by the existing OU1 remedy operation. Since operation of the groundwater portion of the remedy has now been relatively continuous for almost a full year, a report should be submitted by the end of January 1995, as required by the Consent Decree, which assesses the effectiveness of a full year of operation.

8. Cross Sections - The scales used in the 1993 report are different from the scales in the 1992 report. The different scales make it difficult to compare the two reports. Motorola should standardize the scale to be used in future reports, to allow easier comparison on the effectiveness over the years.

9. DM-125 - The results from this well are slightly misleading. Although the shallow ports indicate that there is no contamination in the alluvium, the upper-most bedrock port (125 feet) indicates a concentration of trichloroethene (TCE) of up to 1100 parts per billion. Motorola should explain the presence of the TCE in the bedrock but not in the alluvium. In future reports, Motorola should make a note of the different concentrations in the alluvium and the bedrock.

10. Pursuant to the Consent Decree, the remedy for OU1 includes on-site soil vapor extraction (SVE). To date, Motorola has completed pilot-scale testing of SVE in the courtyard area, however no plans for full-scale operation have been developed. The facilities for the remedy will not be complete until all elements are implemented. Plans for moving to full-scale SVE operation should be submitted to ADEQ within 45 days of receipt of this letter.

11. In relation to comment 10, the lack of on-site controls of soil contamination has potentially allowed contaminants in vapor form to migrate off-site. ADEQ requests that Motorola prepare a plan to collect off-site, at a minimum, soil vapor data. The area to be sampled should be similar to those areas previously investigated prior to completion of the baseline risk assessment for the site. ADEQ expects a draft sampling and analysis plan to be submitted within 30 days of receipt of this letter.

12. The potential for releases of vinyl chloride to the atmosphere at the Integrated Groundwater Treatment Plant was the cause of the temporary shut down of the plant in 1993. Motorola arranged for temporary modifications to the plant in order to allow operation while a permanent modification could be identified. The temporary modification has been in place for almost one year. ADEQ has not received any workplan or proposed design of a permanent modification for the plant. This modification must be complete and tested before the facilities for the remedy can be considered complete.

13. Based on comments 10 and 12, ADEQ does not consider this remedy for OU1 to be complete. Motorola recently began submitting semi-annual progress reports based on their assumption that the remedy has been operational for one year. ADEQ does not agree, and will expect Motorola to immediately resume submitting quarterly progress reports, continuing to do so until further notice from ADEQ.

Unless otherwise specified, Motorola should submit responses to requested data and clarifications within 30 days of receipt of this letter. If you have any questions regarding this letter, please contact me at 207-4181.

Sincerely,

Jeffrey P. Kulon
Project Manager
Remedial Projects Unit

cc: Fred Schauffler, EPA Region IX
Keith Ross, ADEQ

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Fife Symington, Governor Edward Z. Fox, Director

October 14, 1993
RPU93,472

E-4070.3.6.2.5.

Mr. Don Netko
Motorola Inc. (MD C109)
5005 East McDowell Road
Phoenix, AZ 85008

FILE COPY

RE: Motorola 52nd Street Operable Unit Effectiveness Report, 1992

Dear Mr. Netko:

The Arizona Department of Environmental Quality (ADEQ) has reviewed the above referenced document and has the following comments:

1) Executive Summary, Section 6 - Apparent decrease in TCE concentration: The report states that the Operable Unit (OU) effectiveness was based (mostly) on the changes in trichloroethylene (TCE) concentrations. While it is apparent that the TCE concentrations decreased within the OU area, concentrations of TCE also decreased in the East Washington WQARF/Motorola 52nd Street study area. ADEQ believes factors other than operation of the OU may have contributed to the reduced TCE concentrations. Within the study area, almost every facility monitoring groundwater observed a decrease in TCE and other volatile organic compound (VOC) concentrations. Rising water levels of 2 to 10 feet were also experienced over the period that the Salt River was flowing. The most recent (5/93) quarterly sampling results indicate that concentrations are beginning to rise, with a corresponding drop in water levels. The Salt River stopped flowing in early April.

   In addition, within the area where there is DNAPL, some of the decrease in TCE concentrations could be accounted for by the fact that the residence time for the groundwater is less than when the OU was not present. The longer the residence time for the groundwater, the more DNAPL has the potential to dissolve into the water. By pumping and treating, gradients and flow velocities are changed. Therefore the time the groundwater is in contact with the DNAPL is altered, possibly changing the initial VOC concentration in the groundwater.

   Motorola should address this by discussing what effect changing water levels and residence time have on the OU effectiveness report conclusions. The discussion should include data prior to installation of the OU, any regional or local water level data, and TCE or other VOC concentration trends.

2. Section 3.1, Alluvial Aquifer, page 4: The section states that the alluvial aquifer is over 300 feet at 24th St. ADEQ understands the only wells drilled to bedrock at 24th St are DM-515 and the new ADEQ SH-1. Depths to bedrock are 140 feet and 260 feet, respectively. Motorola should include the specific wells which indicate the bedrock is "over 300 feet" deep at 24th St.

3. Section 4.0, Data Analysis, page 7: The determination of a baseline period for the OU is difficult due to the surface water flow in the Salt River and the installation and testing of the extraction wells during the baseline period. Proximity to a pumping well may affect the water level of the monitor wells. Motorola needs to supply information indicating which wells were pumping and the pumping rate. Where possible, Motorola should submit data prior to March 1992, although ADEQ realizes this data to be scarce. The data would help establish the effect of recharge from the Salt River, and effect of nearby pumping wells on the OU baseline water level.

4. Section 5.0, Hydraulic Capture, page 9: According to the July 1993 Poor Quality Groundwater Withdrawal Permit report, DM-313 was taken offline on April 30, 1993. No mention of this appears in the above report dated May 1993. Motorola will need to discuss what this will do to the OU effectiveness. In addition, ADEQ should have been notified of the above action prior to its implementation. In the future, Motorola should submit written requests for changes in the OU prior to implementation of such actions.

5. Section 5.2 and 5.3: As indicated by the report, the drawdown contours and equipotential lines indicate a non-isotropic system. If the system is anisotropic, the capture zones would likely not be symmetrical as portrayed. Motorola should consider the fact that there are two very different hydrologic conditions (alluvial & bedrock) and what affect this may have on the shape of the capture zone.

6. Section 5.3, Apparent Drawdowns and Water-level Trends, page 15: The irregular pattern of the drawdown contours between wells DM-502 and DM-504, Old Crosscut Canal and DM-124 was explained as zones of higher transmissivities. These zones should be reflected in groundwater modeling being performed for the study area.

7. Tables 3 & 4: Table 4 lists the vertical gradients between

different ports with the Westbay and Multi-port wells. A typical Westbay has at least 6 ports. It is unclear what criteria were used to determine which ports were compared. For some wells listed in the report, the upward gradient could be changed to downward depending on what port was used. Motorola should explain and justify the ports used to develop the tables.

8. Figure 4B, Table 4:
Table 4 indicates that DM-603 has an upward gradient of 0.005. As an example of the result of comment 7, using different ports to determine the gradient produced a 0.025 downward gradient. Motorola should consider what effect the much higher downward gradient would have on the upward gradient and what effect this would have on the OU.

Based on the data supplied in this report, ADEQ believes the OU is having a positive effect on groundwater flow and contaminant movement in the alluvial aquifer. Within the bedrock aquifer, the data are not as conclusive. ADEQ suggests detailed discussion of the data prior to drafting future reports on the effectiveness of this activity. We should make this an agenda item for technical committee meetings in the future.

Please contact me if you have questions regarding this letter.

Sincerely,

Jeffrey P. Kulon
Project Manager
Remedial Projects Unit

cc: Keith Ross, ADEQ
Fred Schauffler, EPA Region IX